

# Empirical and Molecular Formula Determination

Or

How do we really know what's in a chemical?

Empirical Formula: The LOWEST whole number ratio of the elements in a compound. Found by using data obtained in a lab

Molecular Formula: The ACTUAL whole number ratio of elements in a compound. It is always a multiple of the empirical formula.

Ex.

4.00 g of Hydrogen mix with oxygen gas to produce 36.0 g of a product. What is the product's % composition by mass? Its empirical formula? Its molecular formula if the molar mass of the product is 18.0 g/mol?

Element	%	Mass	Moles
H			
O			
Totals			

40% of a compound is found to be sodium and the rest is chlorine. What is the compound's % composition by mass? Its empirical formula? Its molecular formula if the molar mass of the product is 58.4 g/mol?

Element	%	Mass	Moles
Cl			
Na			
Totals			

A student has a 119.7 g sample made from iron and oxygen. 30% of the sample's mass is known to be oxygen. What is the empirical formula of the substance?

Element	%	Mass	Moles
H			
O			
Totals			

A beaker contains 0.50 moles of a compound. Analysis shows that 6.0 g of the material in the beaker is hydrogen, 3.0 moles is C and the rest is oxygen. What is the product's % composition by mass? Its empirical formula? Its molecular formula if the molar mass of the product is 181 g/mol?

Element	%	Mass	Moles
C			
H			
O			
Totals			